

To: Burgo, Daniel[Burgo.Daniel@epa.gov]
From: Wharton, Steve
Sent: Fri 8/21/2015 8:04:13 PM
Subject: Fw: Working hypothesis on blue/green colored water - Analytical Results
[Animas Cement Creek Green Color Results.xlsx](#)

Dan - FYI

From: Spence, Sandra
Sent: Friday, August 21, 2015 1:11 PM
To: Wharton, Steve
Subject: FW: Working hypothesis on blue/green colored water - Analytical Results

Hi Steve, this table provides the locations, times and results for the Fe/Algal samples. I got a call from the R8 Lab today, all the chlorophyll A results were nondetect as expected. This confirms absence of an algal bloom at any of the sampling locations.

From: Spence, Sandra
Sent: Wednesday, August 19, 2015 9:47 PM
To: Myers, Craig; Wharton, Steve; Keteles, Kristen; Wall, Dan; Bob Brobst; McComb, Martin
Cc: Laidlaw, Tina; Hermann, Karl; Pierce, Maggie; Ostrander, David; 'sauer@techlawinc.com'
Subject: Working hypothesis on blue/green colored water - Analytical Results

Hi All,

Steve Auer collected samples from 5 locations on the Animas and Cement Creek and drove them back to the R8 Lab today. Steve and I ran the microscopic and ferrous iron analyses this afternoon. We await analysis of the chlorophyll A and nutrient by the R8 lab which will not be available by tomorrow. Please see the attached results for more information.

Here is my interpretation of what we have so far:

The results of the algal microscopic examination as well as the sample filtrations indicate that significant algal blooms are not occurring at any of the sample locations. Chlorophyll A results that will be available later should confirm the presence of minimal algae. Sanarita park and Bakers Bridge may have some growth and benthic algae that could create a visual green color, but bloom conditions are not occurring. Clearly, algae are not significant at A68, A72, CC48. In my opinion, neither the Chlorophyll A nor the nutrient results are necessary to make these

conclusions as it is so apparent that these samples do not contain significant algae. I was able to easily filter large volumes of sample (1 liter) for the analysis which is not possible for samples taken from bloom conditions.

Regarding the possibility that the presence of ferrous iron and the cycling of the oxidation states of iron and other metals is the cause of the green/blue color at particular times in the headwaters, Steve used a Hach colorimeter test to determine the presence of ferrous iron in solution for each sample. This is not a very sophisticated nor sensitive test, so I would consider results as presence/absence rather than quantitative. The results support the presence of ferrous (Fe+2 – green/blue) iron at A72 and at CC48. This is consistent with the field observations of river color that Steve made during sample collection.

So, at this point I don't have any reason to doubt the hypothesis that the blue green color that is being seen in the headwaters, etc. is due to oxidation state changes in iron and possibly other metals.

Here are some talking points for you to consider for your public meeting tomorrow. I hope these are helpful.

Thanks for all you are doing down there,

Sandie

- We believe the blue green color in the upper stretches of the Animas and Cement Creek likely is a result of the fluctuating oxidation states of iron and other metals that occur as they are exposed to oxygen and neutralization processes.
- Iron, for example, is a blue green color in its reduced form and converts to an orange color as it is oxidized. Hence, color changes that include orange and blue green colors are not uncommon with acid mine drainage.
- We collected samples yesterday to test for the presence of reduced iron and algae in the water column.
- Results indicate the absence of significant algal blooms that would explain this color in the water column at upstream sites.
- Results confirm the presence of reduced iron which is consistent with the presence of a blue green color in the water column at upstream sites.

From: Spence, Sandra
Sent: Wednesday, August 19, 2015 7:32 AM
To: Myers, Craig; Wharton, Steve; Keteles, Kristen; Wall, Dan
Subject: Fwd: working hypothesis on blue/green colored water

FYI....

Sent from my iPhone

Begin forwarded message:

From: "Spence, Sandra" <Spence.Sandra@epa.gov>
Date: August 19, 2015 at 7:28:04 AM MDT
To: "Wall, Dan" <wall.dan@epa.gov>, "Ostrander, David" <Ostrander.David@epa.gov>
Subject: Fwd: working hypothesis on blue/green colored water

Anything else you would add? This is all factual in my mind. I took out the part about no additional metals etc.

Sent from my iPhone

Begin forwarded message:

From: "Spence, Sandra" <Spence.Sandra@epa.gov>
Date: August 19, 2015 at 7:25:37 AM MDT
To: "Ostrander, David" <Ostrander.David@epa.gov>
Cc: "Hermann, Karl" <Hermann.Karl@epa.gov>, "Pierce, Maggie" <Pierce.Maggie@epa.gov>, "Wall, Dan" <wall.dan@epa.gov>, "Keteles, Kristen" <Keteles.Kristen@epa.gov>
Subject: Re: working hypothesis on blue/green colored water

Here's what I would say instead...

Deliberative Process/Ex. 5

Sent from my iPhone

On Aug 19, 2015, at 7:10 AM, Ostrander, David <Ostrander.David@epa.gov> wrote:

I would like to have a brief statement for Shaun for the County Commissioners meeting this morning at 8:30. Here is my attempt at a simple explanation. Please let me know if this is not accurate, but recognize I can't really make it more technically complex. Please respond ASAP.

Deliberative Process/Ex. 5